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United States Department of Agriculture,

BUREAU OF PLANT INDUSTRY,

New and Rare Seed Distribution.

WASHINGTON, D. C.

ALFALFA.

Instructions adapted to southern New Jersey, Delaware, southern Maryland, Virginia, Arkansas, Tennessee, and the South Atlantic and Gulf States.

These instructions are intended primarily for those soils that are not of limestone origin.

OBJECT OF THE DISTRIBUTION.—The distribution of new and rare seeds has for its object the dissemination of new and rare crops, improved strains of staple crops, and high-grade seed of crops new to sections where the data of the department indicate such crops to be of considerable promise. Each package contains a sufficient quantity for a preliminary trial, and where it is at all practicable the recipient is urged to use the seed for the production of stocks for future plantings. It is believed that if this practice is followed consistently it will result in a material improvement in the crops of the country.

Please make a full report on the inclosed blank regarding the results obtained with the seed.

DESCRIPTION.

Alfalfa (*Medicago sativa*) is a deep-rooted, hardy, perennial forage plant, belonging to the family which includes beans, peas, and clover. It occupies the same place in western agriculture that cowpeas and clover fill in the eastern third of the United States. As a hay crop, alfalfa is to be preferred to red clover in the eastern portion of the country whenever it can be successfully produced. It is equal, if not superior, to the latter in feeding value and yields a greater tonnage per season. Good cowpea hay is almost equal to alfalfa in feeding value, but the number of crops alfalfa produces in one season makes the total yield per acre much greater than that of cowpeas. Alfalfa is also more easily cured. Since it is perennial, it will last a number of years from one sowing unless crowded out by weeds or otherwise destroyed.

SOIL REQUIREMENTS.

A deep, fertile, well-drained, nonacid soil, reasonably free from weeds, is required. While the crop has been made to grow on soils of almost every texture, still its production on very sandy soil has not generally been a profitable undertaking. It is practically useless to sow alfalfa on thin soils where the bedrock is near the surface, on soil underlain by hardpan, or in locations where the subsoil is so compact that the roots can not penetrate it to considerable depth. It is also equally useless to attempt to grow alfalfa on land where the water table comes near the surface. In porous soils that conduct water readily, standing water at 4 or 5 feet may be injurious. In the closer textured soils, however, the water table may with safety be at somewhat shallower depths, but even then it would be inadvisable to attempt the cultivation of this crop with standing water nearer than 3 feet below the surface. A fluctuating water table near the surface creates more unfavorable conditions for alfalfa than one that is permanent. For the purpose of ascertaining the character of the soil and subsoil and also the depth of the water table, frequent borings should be made with a soil auger. In determining the adaptability of a tract of land to alfalfa, this auger will generally be of greater assistance than a chemical analysis of the soil.

Not only should the land have good underdrainage, but the surface should have sufficient slope to carry off the surplus water readily. Rich river or creek bottom lands which are subject to overflow are well suited to the crop, provided these overflows are not of long duration and the land is otherwise well drained.

PRECEDING CROP.

When once started under favorable soil conditions, weeds will likely prove the most dangerous enemy of alfalfa. For this reason it is best to precede alfalfa for one or two years with crops which are either clean cultivated or which themselves choke out the weeds, as, for instance, cowpeas. In general, sowings on sod lands have not been successful and are not recommended. Early truck and potato crops furnish excellent opportunities for destroying weeds and may usually be taken off the land in time to give ample opportunity to prepare it for fall sowing. The crop can also follow oats or wheat to good advantage, provided the land has previously been treated in such manner as to destroy most of the weeds. Excellent results are also secured on summer fallow, but this system is often objected to on the ground that it results in the loss of the use of the land for a large part of the season.

PREPARATION OF LAND.

Many of the failures to secure a good stand of alfalfa may be traced directly to the improper condition of the seed bed. The soil should be fine and loose for the upper 2 or 3 inches, and below that it should be sufficiently firm to favor capillary action, yet porous enough to insure good drainage and aeration. If possible, at least six weeks should intervene between the time of plowing and that of sowing. Frequent harrowing should be given to settle the ground, produce the necessary fine tilth, and destroy the weed seedlings as they start. Moreover, the land should contain a fair supply of humus. This can be supplied by applications of well-rotted stable manure. Where this is not available it is desirable to plow under some green-manure crop, such as red, crimson, or bur clover, cowpeas, soy beans, or rye and vetch, the kind of crop depending on the locality. Cowpeas can not well be plowed under in time for sowing alfalfa in the same season, as the vines do not have an opportunity to decay before time for sowing. They can be plowed under the autumn previous and the land sown to crimson clover or rye and vetch that fall or to cowpeas the following spring. If sown again to cowpeas, they should be sown early, mowed, and the stubble disked and repeatedly harrowed to bring the soil into the necessary well settled and finely pulverized condition for alfalfa. Red or crimson clover or rye and vetch can be plowed under and the ground harrowed frequently until late summer or early fall, when the sowing should take place. Where alfalfa is to follow wheat or oats the land should be double disked just as soon as these crops are removed and harrowed every week or 10 days until time for sowing. If it is to follow potatoes or some other truck crop and the field is clean, rich, and mellow, the potato vines or other refuse should be raked off, the land disked, and then put into fine tilth with a spike-tooth harrow. In some sections where silage corn is grown, successful stands of alfalfa are sometimes obtained by sowing after the corn is removed, the land being treated in practically the same manner as where the crop follows early potatoes.

LIMING.

Practically all the soils in the region under consideration are benefited by applications of lime. It may be applied with a manure spreader, a fertilizer distributor, a lime distributor, or by hand. Any method which spreads the lime uniformly and at low cost is satisfactory. It should be applied at least two or three weeks before sowing, in order that it may become thoroughly incorporated with the soil. At least a ton of burned lime is generally required, and larger applications are often necessary on the heavier soils. If ground limestone or ground oyster shell is to be used, the quantity should be double that of the burned lime. Experiments have shown very little difference in the final results obtained from the different forms of lime. Burned lime will give quicker results, but the ground limestone and ground oyster shell will finally give the same benefit. The essential element in lime of any form is the calcium oxid, and it is recommended that the farmer use whichever form of lime is cheapest, based upon the percentage of this substance present. Where the consumer pays the freight, it should be remembered that he will not only have to pay such charges on practically twice as much of the ground limestone as of the burned lime, but will also be to the additional expense of hauling and spreading 2 tons of the former to 1 of the latter in order to obtain the same results.

FERTILIZING.

Well-rotted barnyard manure which is comparatively free from weed seeds is the most satisfactory fertilizer. It should be spread on the land before plowing, in order that it may become thoroughly incorporated with the soil. Good results also follow from heavy applications to the preceding crop. If the manure is not available, a liberal application of commercial fertilizers rich in phosphoric acid should be made. The percentage of nitrogen may be low, but some nitrogen should be supplied for the young plants before they become inoculated and are able to secure their supply from the air. On most clay soils heavy applications of potash have not been profitable. A combination which has been commonly recommended is muriate of potash, 75 to 100 pounds; acid phosphate, 350 to 500 pounds; and nitrate of soda, 50 to 75 pounds. The cheapest and most satisfactory method by which the consumer may obtain such a combination is to purchase the desired ingredients and mix them in their proper portions.

INOCULATION.

Nitrogen-fixing bacteria should be provided unless the soil is known to be supplied with these organisms. Inoculation with them may best be accomplished by scattering over the area to be sown soil from a field upon which the crop has previously been grown successfully. The soil should be broadcasted at the rate of 250 to 500 pounds to the acre and harrowed in as soon as practicable. Soil from the roots of sweet-clover plants also will inoculate alfalfa. The practice of sowing a small quantity of alfalfa with the regular sowing of clover and grasses each year for a few years before it is intended to devote the land to alfalfa has in some cases apparently resulted in satisfactory inoculation.

Another method which may be used is that of inoculating the seed with artificial culture, a limited quantity of which can be procured from the United States Department of Agriculture free of charge. Full instructions for use accompany each bottle of culture. The combined use of the soil and the artificial culture is recommended where both can be readily obtained.

SOWING.

The seed should be sown without a nurse crop at the rate of 20 to 25 pounds per acre. In the Piedmont section good stands are secured with a lighter sowing, but the heavier sowings have given the best results. In the coastal plain, where the soils are sandy and badly infested with crabgrass, less than 20 to 25 pounds of seed per acre is not advisable. The seed may be drilled or else broadcasted by hand or with a wheelbarrow seeder and covered lightly with a smoothing harrow or weeder. Drilling gives a higher percentage of germination, and as a result the rate of sowing under this practice may safely be somewhat less than when the seed is broadcasted. A much more uniform stand is secured by dividing the seed and sowing one-half each way of the field. The sowing may take place in the late summer or early fall or in the early spring. It is usually a simpler matter to get the ground in shape for spring sowing, and the moisture conditions are more favorable, but the weeds are apt to overwhelm the alfalfa before it gets a foothold, and for this reason spring sowing is seldom recommended. In the northern part of the region under consideration the middle of August has, on the average, given the best results. In the South Atlantic and Gulf States the date of sowing may with safety be delayed as late as the 15th of October. In these Southern States when weather conditions are especially favorable successful stands are sometimes secured when the seed is sown as late as the 1st of November, but as such late sowings are much more subject to winterkilling and produce lighter yields the first season, they are not recommended.

TREATMENT OF THE STAND.

Ordinarily better stands are maintained where cutting is delayed until the plants are pretty well in bloom or the basal shoots have made a good start. When alfalfa is sown in the spring it is advisable to cut rather high the first time. If there is enough hay to gather with a rake it should be removed from the field; otherwise it may be left on the ground as a mulch. Whenever the plants turn yellow the crop should be cut and removed from the field, no matter what the stage of development. If the stand becomes thin or

patchy, the field should be plowed and reseeded. Attempts at patching up poor stands have generally proved futile. If the weeds threaten to destroy the alfalfa a modified form of the spring-tooth harrow may be used with fair results. However, there is much doubt with regard to the value of cultivation for keeping down weeds or otherwise improving the broadcast stands. No implement which will mutilate the crowns and give an opportunity for the entrance of diseases should be used. A top-dressing of well-rotted stable manure will benefit the crop. This should be applied in the fall or winter and should be evenly distributed, to avoid smothering the plants. If the stable manure is not available, a top-dressing of from 300 to 500 pounds of acid phosphate per acre, with a small amount of potash, may prove beneficial. Alfalfa makes good pasture for nearly all kinds of farm animals, but under no circumstances should it be pastured until it has become thoroughly established or when the ground is wet or frozen. It should not be pastured closely at any time, for the grazing down of the crowns will often result in its destruction. Owing to the difficulty of procuring a good stand in the East, it is very doubtful whether a farmer should take the chance of injuring a well-established stand by pasturing it at all. Profitable results have been obtained, however, by removing the first two crops for hay and then pasturing with hogs for the remainder of the season. In the fall the hogs should be removed in time to allow a 6-inch to 8-inch growth for the protection of the plants during the winter months.

TWO LEADING COMMERCIAL VARIETIES OF ALFALFA.

Common alfalfa.—Under this designation is included the greater part of the alfalfa grown in the United States, the seed from the various sources frequently being named after the State in which it was produced. Where alfalfa has been grown under certain conditions for a considerable time there is a tendency through elimination to produce a more or less distinct strain, presumably best adapted to the conditions under which it was developed. Thus, for instance, seed from fields that have resulted from several seed generations in Montana and the Dakotas may produce plants that will prove to be somewhat more hardy than those from seed grown farther south. Such northern-grown seed is preferred to the southern-grown seed for the northern part of the United States. In purchasing seed of common alfalfa an effort should be made to procure it from approximately the same latitude as that in which it is to be grown.

Grimm alfalfa.—Grimm alfalfa was introduced into this country in 1857 from Baden, Germany, by Wendelin Grimm, of Carver County, Minn. Careful investigations indicate that it owes its superior hardiness to the fact that it is the result of a natural cross between the common variety and the yellow-flowered alfalfa (*Medicago falcata*) and by virtue of its being exposed to numerous severe winters the weaker plants were eliminated, leaving only the more hardy ones to perpetuate the strain. Grimm alfalfa does not differ materially in appearance from the ordinary strain, so that the casual observer has difficulty in distinguishing one from the other. While a large percentage of its flowers are of the same color as those of common alfalfa, there are some that represent many shades of violet, yellow, and other hues. The taproots show a tendency to branch, and the crowns are inclined to be low set and spreading, characteristics which undoubtedly are of great importance in rendering the variety resistant to drought. Grimm alfalfa is one of the hardiest, if not the most hardy, of our commercial strains. It is recommended for sections where the winters are especially severe and where little protection is given by snow. In sections where winterkilling is not an important consideration it is not thought to be materially superior to common alfalfa.

PUBLICATIONS AVAILABLE.

For further details regarding alfalfa, see Farmers' Bulletins Nos. 757, Commercial Varieties of Alfalfa; 1229, Utilization of Alfalfa; and 1283, How to Grow Alfalfa, which will be sent free of charge upon application to the Secretary of Agriculture, Washington, D. C.

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